Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended): A time of flight mass spectrometer for measuring the m/z of ionized particles, the spectrometer comprising:

an ion source for generation of said ionized particles,

acceleration means for acceleration of said ionized particles so as to form an ion beam,

means for sampling from the ion beam such that a share of the beam is detected on each of two detectors such that the time of flights for any or all ions of a given m/z to each of the two detectors is used for the purpose of improving the accuracy of measurement of the m/z values of ions, wherein one of the two detectors is positioned so as to intercept at least a first portion of the ionized particles and to permit a second portion of the ionized particles to continue past the detector~~.~~,

and a data processor adapted for calculating differences or average differences in arrival times of corresponding particles at each of said two detectors to enable said m/z characteristics to be determined.

2. (Original): A spectrometer according to claim 1, in which the spectrometer includes temporal focusing means for at least partially compensating for any spread in the initial kinetic energies of particles of a given m/z so as to provide two temporal focal points, wherein each detector is situated at a respective temporal focal point.

3. (Previously Presented): A spectrometer according to claim 1, wherein the spectrometer includes interfacing means for transporting, or allowing the transport of ions from a sample to the acceleration means.

4. (Original): A spectrometer according to claims 1 to 3 wherein the direction of the ion beam at the entry to the acceleration means is inclined at any angle to the direction of acceleration.

5. (Original): A spectrometer according to claims 1 to 4, in which the focusing means comprises reflection means for reflecting the particles in the beam in such a way that the higher the kinetic energy of particles of a given charges and mass, the longer the path of those particles through the reflection means, the reflection means being situated in the path of the beam between the two detectors.

6. (Original): A spectrometer according to claim 5, in which the focusing means comprises further reflection means positioned in the path of the beam between the sample and first of the detectors so that the beam is of a generally serpentine shape.

7. (Original): A spectrometer according to any of the preceding claims, in which the spectrometer includes a laser for releasing said ionized particles from the sample or any other ion source used in mass spectrometry.

8. (Original): A spectrometer according to any of the preceding claims, in which the focusing means further comprises delay means for delaying the operation of the acceleration means for a set time after the release of said ionized particles.

9. (Original): A spectrometer according to any of the preceding claims, in which the spectrometer includes data processing means is connected to both detectors and is operable to identify corresponding portions of the detector outputs, and measure the difference between the times at which said portions occurred.

10. (Original): A spectrometer according to claim 8, in which said portions comprise peaks in the outputs of the detectors.

11. (Original): A spectrometer according to any of the preceding claims, in which the spectrometer is a MALDI-TOF spectrometer.

12. (Original): A spectrometer according to claim 3, in which the interacting means comprising trapping means for temporarily trapping particles released from the source in a zone adjacent the sample prior to the acceleration of the particles.

13. (Original): A spectrometer according to claim 11, in which the trapping means includes means for injecting a gas into that zone to interact with the particles.

14. (Currently Amended): A method of time of flight spectrometry for measuring characteristics of the m/z of ionized particles, the method comprising:

releasing said ionized particles from a sample;

accelerating said particles along two paths;

measuring the times of arrival of the particles at ~~two points~~ first and second points associated with first and second detectors, respectively, one on each respective path, at differing distances from said sample, wherein the measuring includes intercepting at least a first portion of the particles on one path at a focal point and permitting a second portion of the particles to continue past the focal point; and

measuring the differences or average differences in arrival times of corresponding particles at said points to enable said m/z characteristics to be determined.

15. (Currently Amended): A method of time of flight spectrometry for measuring characteristics of the m/z of ionized particles, the method comprising:

releasing said ionized particles from a sample;

accelerating said particles along two paths, in which both of said paths are contained in a single particle beam, with one path running alongside, but stopping short of, the other;

measuring the times of arrival of the particles at ~~two~~ first and second points, one on each respective path, at differing distances from said sample, wherein the first point and the second point are associated with a first detector and a second detector, respectively; and

measuring the differences or average differences in arrival times of corresponding particles at said points to enable said m/z characteristics to be determined.

16. (Original): A method according to claim 14, in which the beam is of a generally serpentine shape.

17. (Previously Presented): A time of flight mass spectrometer for measuring the m/z of ionized particles, the spectrometer comprising:

an ion source for generating the ionized particles;

an accelerator for accelerating the ionized particles to form an ion beam;

first and second detectors for detecting at least some of the ionized particles from the ion beam; and

a first reflectron for reflecting at least some of the ionized particles towards the second detector, wherein the first reflectron is disposed between the first and second detectors, and wherein the second detector is positioned so as to intercept at least a first portion of the reflected ionized particles and to permit a second portion of the reflected ionized particles to pass; and

a data processor adapted for calculating a differences or average differences in arrival times of corresponding particles at said first and second detectors to enable said m/z characteristics to be determined.

18. (Previously Presented): The spectrometer of claim 17 wherein the second detector is positioned at a focal point where a first ionized particle overtakes a second ionized particle of lower velocity.

19. (Previously Presented): The spectrometer of claim 18 wherein the second detector is a multi-element detector.

20. (Previously Presented): The spectrometer of claim 17 further comprising a trapping cell for decoupling an extraction time of at least some of the ionized particles from a timing associated with the spectrometer, wherein the trapping cell is operable to delay the trapped ionized particles before the trapped ionized particles are accelerated.

21. (Previously Presented): The spectrometer of claim 17 further comprising:

a third detector; and

a second reflectron, wherein the second reflectron is disposed between the second and third detectors.

22. (Previously Presented): The spectrometer of claim 21 further comprising an ion gate positioned between the first and second reflectrons.

23. (Previously Presented): A method for measuring the m/z of ionized particles using a time of flight spectrometer, the method comprising:

generating the ionized particles;

accelerating the ionized particles to form an ion beam;

reflecting at least some of the ionized particles from the ion beam towards at least one of a first and second detector;

detecting at least some of the ionized particles with the first and second detectors, wherein the detecting includes intercepting at least a first portion of the reflected ionized particles with the second detector and permitting a second portion of the reflected ionized particles to continue past the second detector; and

calculating the m/z of at least some of the detected ionized particles using a difference or average difference in the time of flights for any or all ions of a given m/z to each of the two detectors.

24. (Previously Presented): The method of claim 23 further comprising delaying at least some of the ionized particles before the ionized particles are accelerated.

25. (Previously Presented): The method of claim 23 further comprising selecting parent ions for fragmentation.

26. (Currently Amended): A time of flight mass spectrometer for measuring the m/z of ionized particles, the spectrometer comprising:

an ion source for generation of said ionized particles;

an accelerator for acceleration of said ionized particles so as to form an ion beam;

at least two detectors for sampling from the ion beam, such that a share of the ion beam is detected on each of the two detectors; and

~~means for using the difference or average differences in the time of flights for any or all ions of a given m/z to each of the two detectors for improving the accuracy of measurement of the m/z values of ions.~~

a data processor adapted for calculating differences or average differences in arrival times of corresponding particles at each of said two detectors to enable said m/z characteristics to be determined.

27. (Previously Presented): A method for measuring the m/z of ionized particles using a time of flight mass spectrometer, the method comprising:

generating said ionized particles using an ion source;

accelerating said ionized particles so as to form an ion beam; and

sampling from the ion beam using at least two detectors, such that a share of the ion beam is detected on each of the two detectors, wherein the difference or average differences in the time of flights for any or all ions of a given m/z to each of the two detectors is used for improving the accuracy of measurement of the m/z values of ions.